

[0129] ii. the incident light is linearly polarized in which case it will emerge circularly polarized;

[0130] the incident light is elliptically polarized in which case it will emerge as elliptically polarized.

[0131] The retarder (45) is thus incorporated only if required to alter the polarization orientation of the light reflected from the rear screen (10) before it being transmitted or reflected by the wire grid polariser (44).

[0132] FIG. 9 shows an embodiment of the present invention identical to that shown in FIG. 8, with the exception that the optical retarder (45) is omitted. Like components (10, 20, 44, 47) are like numbered. Similarly, the transformation of the light (46, 47, 48, 49) emitted from the TOLED (30), reflected from the wire grid (44), transmitted through the TOLED (30), and that incident on the rear screen (10) is identical to that shown in FIG. 8 with like reference numbering. The Jones vectors associated with the light (46, 47, 48, 49) and the Jones matrices characterizing the front screen (20), rear screen (10), TOLED (30) and wire grid polariser (44) are also identical to the previous embodiment.

[0133] Thus, considering the situation following the incidence of light (49) on to the rear screen (10) that has not passed through a retarder (45), the subsequent transitions are as follows; The incident light (49) characterized by the Jones vector

$$\begin{bmatrix} 1 \\ 0 \end{bmatrix}$$

[0134] is reflected by rear screen (10) with a resultant transformation given by the equation;

$$\frac{1}{2} \begin{bmatrix} 1 & i \\ -i & 1 \end{bmatrix} \begin{bmatrix} 1 \\ 0 \end{bmatrix} = \frac{1}{2} \begin{bmatrix} 1 \\ -i \end{bmatrix}. \quad \text{vi)}$$

[0135] The reflected light (56) then passes through the TOLED (30) again. As the Jones matrix of the TOLED (30) is the identity matrix

$$\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix},$$

[0136] the resultant effect of the transmission as given by the equation;

$$\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \frac{1}{2} \begin{bmatrix} 1 \\ -i \end{bmatrix} = \frac{1}{2} \begin{bmatrix} 1 \\ -i \end{bmatrix}, \quad \text{vii)}$$

[0137] leaves the resultant light (57) unchanged.

[0138] The light (57) transmitted through the TOLED (30) is then transmitted through the wire grid (44) characterized by the Jones matrix

$$\begin{bmatrix} 0 & 0 \\ 0 & 1 \end{bmatrix}$$

[0139] to the extent given by the equation;

$$\begin{bmatrix} 0 & 0 \\ 0 & 1 \end{bmatrix} \frac{1}{2} \begin{bmatrix} 1 \\ -i \end{bmatrix} = \frac{1}{2} \begin{bmatrix} 0 \\ -i \end{bmatrix}. \quad \text{viii)}$$

[0140] In accordance with recognised convention, the imaginary component is only considered as a mathematical aid in expressing the polarisation orientation. The resultant output (58) gives a Jones vector of

$$\frac{1}{2} \begin{bmatrix} 0 \\ -i \end{bmatrix}$$

[0141] in comparison with a Jones vector of

$$\frac{e^{i\pi}}{2} \begin{bmatrix} 0 \\ 1 \end{bmatrix}$$

[0142] for the corresponding light output (54) produced in the embodiment incorporating a retarder (45). This difference is just a phase shift of 180 degrees with respect to the other. Since the eye integrates over time it cannot distinguish this difference, and the resultant luminance of the both embodiments appears the same.

[0143] Thus, when using a cholesteric liquid crystal rear display (10), or other display with the same reflective properties, the retarder (45) may be omitted without detriment. If, however, the rear display (10) and/or any additional optical components that may be placed in the light path from the TOLED (30) to the front screen (20) results in a misalignment between the polarisation axis of the wire grid (44) and the light incident on it, the retarder (45) may be used to correct for misalignment.

[0144] As visual display unit back lights and other such illumination sources generate heat which may can be difficult to dissipate without constraints on casing design and/or the need for active cooling such as fans. Placing the illumination source forward of the front screen may alleviate such heating issues. Thus, an illumination assembly may, for example, be used with single screen displays to replace backlights in applications such as notebook computers and the like.

[0145] In such instances, the wire grid polariser (44) is formed on the inner surface of a substrate, or between substrate layers in a sandwich construction, to protect the delicate wire grid.